

WHAT IS CLAIMED IS:

1. An image pick-up apparatus comprising a wavelength converter for converting an incident radiation to a light having a wavelength detectable with a photoelectric conversion element on a sensor substrate on which plural photoelectric conversion elements and switching elements are disposed, wherein

a flattening layer having a flat face making a contact with the wavelength converter is provided between the sensor substrate and wavelength converter.

2. An image pick-up apparatus according to Claim 1, wherein the flattening layer is obtained by flattening a protective layer provided on the sensor substrate.

3. An image pick-up apparatus according to Claim 1, wherein the flattening layer is provided on a protective layer on the sensor substrate.

4. An image pick-up apparatus according to Claim 1, wherein a second flattening layer is provided on the wavelength converter.

5. An image pick-up apparatus according to Claim 4, wherein the second flattening layer covers the end face of the wavelength converter.

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7. An image pick-up apparatus according to Claim 4, wherein a light reflection film is provided on the second flattening layer.

9. An image pick-up apparatus according to Claim 1, wherein the wavelength converter comprises a scintillator.

11. An image pick-up apparatus according to Claim 9,
wherein the scintillator comprises a CsI crystal.

13. An image pick-up apparatus according to Claim 8,

20. An image pick-up apparatus according to Claim 19, wherein the scintillator layer comprises a columnar crystal.

21. An image pick-up apparatus according to Claim 20, wherein the scintillator layer comprises a CsI crystal.

22. An image pick-up apparatus according to Claim 18, wherein the light reflection film is made of an aluminum film.

23. An image pick-up system comprising an image pick-up apparatus provided with a wavelength converter for converting an incident radiation to a light having a wavelength detectable with a photoelectric conversion element on a sensor substrate on which plural photoelectric conversion elements and switching elements are disposed, wherein a flattening layer having a flat face making a contact with the wavelength converter is provided between the sensor substrate and wavelength converter, comprising

a signal processing means for processing the signal from the image pick-up apparatus; and

a display means for displaying the signal from the signal processing means.

24. An image pick-up system according to Claim 23, further

25. An image pick-up apparatus system to Claim 23, further comprising a recording means for recording the signal from the signal processing means.

27. An image pick-up system comprising:

a signal processing means for processing the signal from the image pick-up apparatus; and

28. An image pick-up system according to Claim 27, further comprising a recording means for recording the signal from the signal processing means.

30. An image pick-up system according to Claim 27, further comprising a storage means for storing the signal from the signal processing means.

forming a protective layer on a sensor substrate on which plural photoelectric conversion elements and switching elements are disposed;

forming a wavelength converter on the flattening layer.

33. A method for manufacturing the image pick-up apparatus according to Claim 32, wherein the second flattening layer covers the end face of the wavelength converter.

34. A method for manufacturing the image pick-up apparatus according to Claim 31, comprising a step of flattening the wavelength converter.

35. A method for manufacturing the image pick-up apparatus according to Claim 32, comprising a step for providing a light reflection film on the second flattening layer.

36. A method for manufacturing the image pick-up apparatus according to Claim 34, comprising a step of providing a light reflection film on the flattened wavelength converter.

37. A method for manufacturing the image pick-up apparatus according to Claim 31, wherein the step for forming the wavelength converter comprises a vacuum deposition step.

38. A method for manufacturing the image pick-up apparatus comprising the steps of:

forming a protective layer on a sensor substrate on which plural photoelectric conversion elements and switching elements are disposed;

flattening the surface of the protective layer; and

forming a scintillator layer on the flattened protective layer.

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44. A method for manufacturing the image pick-up apparatus according to Claim 38, wherein the step for forming the wavelength converter comprises a vapor deposition step.

disposing plural sensor substrates on which plural pairs of a photoelectric conversion element and a switching element are disposed, a flattening layer being formed on respective plural sensor substrates; and

46. A method for manufacturing an image pick-up apparatus according to Claim 45 comprising the step of forming a second flattening layer on the wavelength converter.

48. A method for manufacturing an image pick-up apparatus according to Claim 46, comprising a step of providing a light reflection layer on the second flattening layer.

50. A method for manufacturing an image pick-up apparatus

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51. A method for manufacturing an image pick-up apparatus according to Claim 45, wherein the wavelength converter comprises a CsI crystal.